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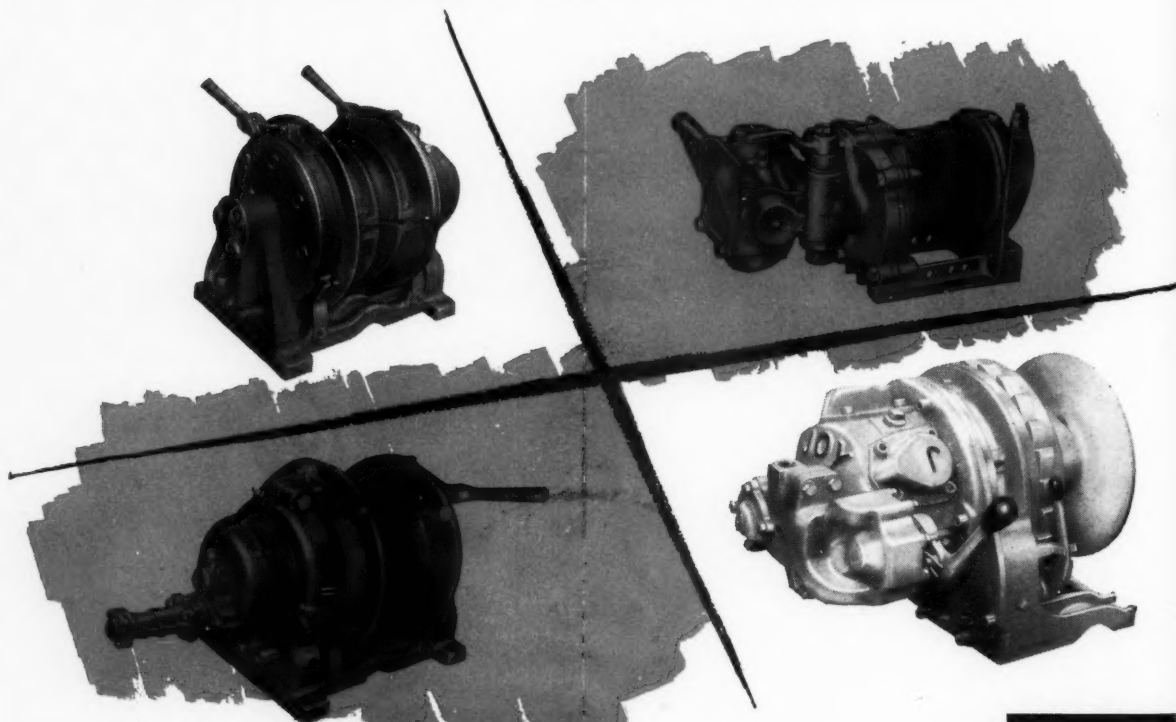
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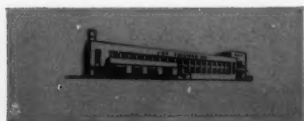
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In this issue . . .

Copper and the U.S. Strike	285
Minerals Exploitation in the Negev	286
Coal in Western Europe	286
Britain's Impressive Output of Strontium	287
Illicit Diamond Mining in Guinea	288
The Iranian Mining Industry	289
Ore Supplies for the Aluminium Industry	291
Machinery and Equipment	293
Mining Miscellany	294
Metals and Minerals	295
London Metal and Ore Prices	295
Mining Finance	297
Company Meetings	299
Publications Received	300
Coming Events	301

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Copper and the U.S. Strikes

FOR over a month more than three-quarters of the U.S. copper mining industry and its processing plants have been closed, as well as some 40 to 50 per cent of the lead mining industry and a smaller percentage of domestic zinc producers. These strikes are the most widespread since 1946, when a large part of the U.S. copper industry was at a standstill during the first half of the year. In 1955 about 60 per cent of U.S. copper production was halted by strikes that lasted for about 40 days.

According to trade estimates based on analysis of the 1958 production figures by domestic mines, there is only about 14 per cent of the monthly U.S. copper mine output which remains entirely unaffected by the strikes of the United Steelworkers and the Mine Mill and Smelter Workers' Union. This 14 per cent represents 11,400 s.tons per month. The remaining 86 per cent—70,300 tons—is being either not mined or not refined. Of this 86 per cent, nearly 68 per cent—55,300 tons—is not being mined at all. The balance—amounting to some 15,000 tons—is being mined, but is not being smelted or refined, though it will, of course, be available for refining when the plants on strike are restarted.

The International Union of Mine, Mill and Smelter Workers is asking for benefits that would total more than 30 cents an hour in increased labour costs, including a pay increase of 7 cents an hour. The industry has refused to meet these demands in the negotiations for new contracts to replace those which expired on June 30. This attitude is in line with the policy adopted by the steel companies in the nation-wide stoppage which has already lasted more than 10 weeks.

Employers in the copper industry are in a strong position, having regard both to the high level of world stocks and to the fact that customers, having had ample warning of the impending strike, started building up inventories as far back as February. The workers, on the other hand, and doubtless for the same reasons, were clearly reluctant to face a showdown, as indicated by the extension of the deadline until August 19—several weeks after the former contracts had expired.

The settlement, when ultimately arrived at, will doubtless be on broadly similar lines to whatever agreement is reached in the steel industry. Meanwhile, an attempt by Anaconda workers at Butte to secure a return to work pending general agreement throughout the industry has been unsuccessful. A meeting between Kennecott and the International Union of Mine, Mill and Smelter Workers is taking place next week "to explore mutual problems". In general, however, present indications are that the strike is likely to last well into October. By that time a sizeable hole will have been made in the aggregate total of U.S. and world stocks, which until very recently were regarded as the major threat to continued price stability.

The pressure on world stocks will, of course, be further intensified in what appears at the time of writing to be the improbable event of a copper strike in Chile. The Copper Conciliation Board is meeting again next Sunday to consider the dispute at Braden's establishments.

The outlook is further complicated by the possibility of a strike of longshoremen in New York, which is a potential threat to copper imports (lead and zinc quotas can, no doubt, be adjusted to suit the supply position). According to the latest advices this strike may not take place.

While the strike in the non-ferrous industry, if it lasts long enough, might normally be expected to result in growing pressure on copper supplies and a further rise in lead-zinc prices, these effects should be counteracted (to a quite unpredictable extent) by the decline in U.S. consumption of non-ferrous metals which would be the inevitable consequence of the stoppage in the steel industry if it lasts much longer. General Motors has confirmed reports that its operations face imminent threat of gradual shutdown unless steel production is resumed in the next few days. Other motor car manufacturers must soon find themselves in the same position, as indeed will other large sections of U.S. industry. This would obviously have a severe impact on consumption of copper, lead, tin, zinc and other metals, not excluding aluminium which is already feeling the effects of the strike. Third-quarter aluminium business is now expected to drop below second-quarter levels.

In view of the immense capacity of U.S. industrial plants, it can be anticipated that the backlog of orders will be rapidly overtaken once steel is again available and American industry is again in full swing. It is evident, however, that a considerable interval must necessarily occur between the re-opening of shutdown steelworks and the resumption of normal deliveries to customers. The probability must be faced that not all the business currently being lost as a result of the long shutdown in the steel industry will be recovered.

These conflicting elements in a complex situation are at least partially accountable for the curious behaviour of the London market, where copper prices instead of rising with the prospect of a tightening supply position have latterly been drifting downwards. From a long-term standpoint this situation gives cause for considerable satisfaction, since the return of inflated prices, no matter for how short a period, might well jeopardize the healthy expansion of the copper industry by giving a renewed impetus to the development of alternative materials.

Some rise in prices must sooner or later occur if the world's largest producer continues to lose nearly three-quarters of its mine output, but fortunately for the industry the impact of this major strike on customers will be considerably less severe than would have been the case in former years.

The lesson to be drawn from the present emergency is that, in an industry as susceptible to strikes as copper production, the existence of large stocks and adequate reserve capacity is by no means an unmixed liability, but may well be a source of strength.

MINERALS EXPLOITATION IN THE NEGEV

Timna Copper Works in the Negev, having attained full capacity production recently, are now going ahead with plans to expand by another 20 per cent. This was disclosed by the Managing Director of Israel Mining Industries Ltd. at a session of the Technological Advisory Board of the Ministry of Development in Jerusalem. It was stated that, since the Timna plant started production about a year ago, the equivalent of \$1,500,000 worth of copper in the form of copper cement has been produced. Tests in the pilot-plant stage were being conducted on a water-saving device and the plant's engineers had succeeded in reducing by one-fourth the amount of sulphuric acid needed in the refining process.

Meanwhile, it is reported that a rich vein of ore with a copper content up to five per cent has been discovered

at Timna. It is also learned that underground mining at Timna started some six months ago.

This year's meeting of the Technological Advisory Board was opened by its chairman, Sir Ben Lockspeiser, with the statement that an excellent opportunity is given for the development of an extensive chemical industry based on the rich sources of a variety of raw materials (such as potash, phosphates and natural gas) concentrated in a 1,000 square kilometre area in the Negev region. In this connection, the Director-General of the Ministry of Development, Mr. M. Bader, declared that a five-year plan, drawn up for the development of chemical industrial enterprises in the Negev, would call for an overall investment of I£.900,000,000 (equal to about £180,000,000 sterling), of which the Government would put up I£.500,000,000. Of this sum, about I£250,000,000 (i.e., 50 per cent) would go to the expansion of mining and the refining of minerals and Dead Sea potash. There would also be the urgent necessity of investing some I£.200,000,000 (approximately £40,000,000 sterling) in the extension of Eilat Port facilities, in the building of roads, particularly a highway to Sodom on the Dead Sea, and in power stations and water installations.

The Advisory Board, in the course of its first sessions, has recommended that the field survey of the Manara iron ore zone in the northern part of the country be completed at an early date and that work begin on enriching the iron ore mined in that region.

Our correspondent in Israel further reports that the Technological Advisory Board, at a meeting in Jerusalem, has recommended the allocation of I£.50,000 (about £10,000 sterling) for the purchase of special equipment for the Israel Mining Industries' laboratories. This equipment will be used in prospecting for metallic ores with radio isotopes.

It has also been announced that the two representatives now in Israel of a major Japanese chemical firm have initiated a contract with the Israel Mining Industries Ltd. for the patent rights to a process for the manufacture of phosphoric acid. The process, developed by the laboratory activities of the Israel Mining Industries enterprise, makes it possible to produce phosphoric acid from phosphate rock and hydrochloric acid.

The contract will now be submitted to the Japanese company's head offices for approval and a final decision is expected within a month.

The exceptionally cool summer with its relatively high humidity in the Negev this year has affected potash production. Dead Sea Works Ltd. as previously reported, had planned to produce 135,000 tons of potash this year (last year's output was 107,000 tons), but unless the weather situation improves considerably during the months of September and October, output may well fall to about 110,000 tons—in spite of the fact that so far 27,000,000 cu. m. of sea water have been let into the settling pans this year as compared with 20,000,000 cu. m. the year before.

COAL IN WESTERN EUROPE

In an attempt to halt the build-up of unsold coal stocks the Ruhr mines propose to meet the coal crisis by closing some 15 of the less economic pits, so reducing annual capacity from 130,000,000 tons to about 122,000,000 tons. This is part of a rationalization programme drawn up by the industry which aims to reduce the number of miners from the existing 300,000 to about 250,000 by 1961. Natural wastage will account for much of the drop in numbers.

Many German leaders consider that a substantial financial

levy on fuel oil is long overdue and the Federal Economic Cabinet has proposed a duty of 50/- a ton on all grades of fuel oil. Regarding the future for miners soon to be made redundant, government proposals are well advanced for the payment of allowances to miners who must learn new trades. The money is to be found partly by the Federal Government and partly by means of a grant from the European Coal and Steel Community.

As at mid-September the Ruhr had 17,000,000 tons of unsold coal at pithead, with many miners on short time. At current production, the tax would yield DM. 300,000,000 (£25,000,000).

Meanwhile it is reported from Vienna that emergency measures may have to be taken to meet the difficulties of the State-owned Austrian coal industry, which is suffering from the competition of water power, fuel oil and natural gas. The completion of pipelines for natural gas from the oilfields to Austria's industrial areas is expected to lead to a reduction of coal sales of 400,000 to 500,000 tons a year. Indeed, from a peak output of more than 7,000,000 tons in 1957, Austrian coal and lignite production will be some 900,000 tons down this year. This reduction means that 2,000 of the 18,000 Austrian coal miners are threatened with redundancy.

The combined mining industries of the European Coal and Steel Community plan in the current year to spend a total of

\$44,000,000 on investment in iron ore mining and ore preparation. This sum is approximately that which was spent by the six Community countries in 1958. In 1960, however, investments in iron ore will fall sharply at the same time as iron and steel investments fall; the 1960 annual investment figure will be one of only \$32,000,000. The iron ore investment total (1960 figures in brackets) will be split up as follows: \$23,500,000 (\$17,000,000) for production, \$11,000,000 (\$6,000,000) for preparation and processing and \$9,000,000 (same) for above-ground plant and installations.

Hard coal investments will be \$509,000,000 in 1959 and \$376,000,000 during next year. Of this sum \$303,000,000 (\$243,000,000) will be spent on the pits themselves, \$66,000,000 (\$37,000,000) on pithead coking plants, \$8,000,000 (same) on briquetting plants and \$126,000,000 (\$58,000,000) on pithead power stations and other power units.

The Community's investments in the field of brown coal and combustion coke will this year be double the 1958 figure, at a total of \$6,100,000. Next year, however, it will be cut to only \$4,300,000.

Coal mines in the six countries of the Community lost 9,660,000 tons of coal through non-working shifts in the first eight months of this year. This figure compares with a total of 6,300,000 tons lost through non-working shifts in the whole of last year.

Britain's Impressive Output of Strontium

NINE-TENTHS of the world's output of strontium sulphate is produced in the United Kingdom by the Bristol Mineral and Land Co. Ltd. The material has been mined at Chipping Sodbury since 1912 and is 95 per cent pure when won.

The largest producer of strontium salts in the world is probably the Du Pont Co. of America. The Bristol Mineral and Land Co. Ltd. supplies this company with its basic requirements.

The strontium sulphate mined at Chipping Sodbury is embedded in clay when mined. The company found that by scraping the mineral from the clay, large amounts of residue were being discarded. This residue contained 60 per cent of strontium sulphate.

Influenced by this realization as well as by the increasing demand for a cleaner product, Bristol Mineral and Land purchased a Parker Monarch 20 in. by 10 in. jaw crusher to reduce the mined material, a No. 4 Contra-flow washer to wash and screen it into three sizes, and a Sandowheel dewaterer for the recovery of fines.

Previously a great deal of the strontium sulphate was sold in lump form, but now it is thought that the treated material will supersede the lump product.

The output of strontium sulphate from the Bristol Mining and Land Co. Ltd. is won by a labour force of only approximately 30 men.

The contra-flow washer in operation



Illicit Diamond Mining in Guinea

The difficulties of the diamond mining industry in Guinea are discussed by A. Moyer in his world-wide review entitled "The Diamond Industry in 1957-1958", edited by Vlaams Economisch Verbond, Schoenmarkt 31/VII, Antwerp

THE mines of French West Africa, situated on the Ivory Coast and in Upper Guinea, produce mainly industrial diamonds, except for one deposit on the Ivory Coast and another in Guinea, which produce a high proportion of gem stones. Illicit mining has led to a steep decline in production and, in some regions, it has put a complete stop to prospecting.

The Bureau de l'Union Syndicale des Mines d'Outre-Mer, in its report for 1957, describes the situation in the Guinea diamond concessions in the following terms:

"The year 1957 was marked by the recrudescence of illicit mining already pointed out in 1956. By thousands, and even sometimes by tens of thousands, the Natives install themselves on company concessions or "leases" and pick the eyes out of the deposits. After their departure the deposits are in a state of complete confusion and can no longer be put to profitable development.

"Agreements were arrived at early in 1957 between the Guinea Government and the companies concerned. Under the terms of these agreements the mining companies had, with compensation, to give over to illicit activity a part of the permits for which they had paid the considerable cost for investigation and equipment. A co-operative society was formed with a view to restoring the irregular workers to honest employment.

"But very soon new demands arose, the illicit diggers over-stepped the areas reserved for them, and the local population put obstacles in the way of legitimate holders of prospecting and mining leases.

"On the other hand, the local authorities applied the terms of the agreements only half-heartedly: movements of the population were not stopped, compensations have not yet been paid, the new prospecting and mining permits that should have been forthcoming by way of compensation have not yet been issued.

"The production of French West Africa has dropped, for these reasons, from 390,000 m. ct. in 1956 to 247,000 m. ct. in 1957." (Metric carats.)

European Production

Societe Minière de Beyla produced only 62,463 ct. in 1957 compared with 206,816 ct. in 1956 — a fall of 70 per cent. The output is mainly industrial and boart. Plans intended to provide for the mining of low grade ore were put into effect in 1957. The equipment has been extended and mining capacity has been considerably increased. All prospecting work has been suspended, however, and, because of illicit mining, the company's programme is limited to the mining of its principal deposit and the study of its extensions.

Societe Guinéenne de Recherches et d'Exploitation Minières (Soguinex) produced only 29,731 ct. in 1957 against 50,000 in 1956 and 65,700 in 1955. The treatment plant at Feredou has had to be dismantled; it was found to have been erected on one of the deposits that the company has had to transfer, under promise of indemnity, to Native

miners; the plant has been re-erected on the Ferouba field. All investigations have been interrupted and, owing to local circumstances, it is impossible for the company to plan a programme for the future.

African Production

To the total production of French Guinea during 1957, namely 163,250 m. ct. having an f.o.b. value of 312,500,000 Fr.C.F.A., the African output contributed 53,500 ct. with an f.o.b. value of 142,500,000 Fr.C.F.A. However, the latter figures represent only the part of the African output that has been registered officially and on which taxes and dues have been paid.

It is notorious that, in addition to the declared production, a large secret export to Liberia continues. According to information from a private source, this fraudulent trade is carried on in small parcels of about 5,000 ct. and its size is estimated to be between 60,000 and 70,000 ct. per month; the present magnitude of these illicit dealings would appear to amount to 700,000-800,000 ct. per annum.

The African diggings are situated in the purlieu of Kissidougou, Beyla and Macenta, mainly in the territory of Kérouané. For the most part the diggers are Mandigoes but there are Mossis among them and Fulahs from Sudan. The placer of Famarodou, which was overrun in the first instance and then given up to the irregular diggers, is almost exhausted; it is still worked but the diggings have shifted towards the west where very fine quality gemstones are found. Digging is carried on actively by the "irregulars" on the deposits situated within the concessions of the European companies, who find it impossible to prevent it.

It may well be assumed that, since the end of 1956, the African diggers, by their wastefulness, have ruined deposits which, rationally exploited, could have provided more than 10 years of mining activity and produced between 1,500,000 and 2,000,000 ct.

The Bekima

At the beginning of February 1957, and at the instigation of the government, the co-operative society of African miners known as the Bekima was created in order to convert illicit activities into a legalized industry and thereby conduct production through the channel of legal exports. This organization appears to have been formed in a slipshod manner and has, in effect, been simply a screen concealing secret exploitation on the deposits leased to European companies in repudiation of the agreements concluded, and the large-scale illegal exports to Liberia. Bekima's official exports account for only a trifling portion of the actual production.

On the other hand, the deplorable conditions in which the co-operative members expect labourers to work for them have aroused the protest of the local authorities and a delegation of diggers has been called before an inter-ministerial Guinea Commission. Having examined the situation on the native placers and enquired into the question of diamond sales, the authorities expressed their intention to close the Bekima, either temporarily or for good. It was decided, however, to suspend that measure for the time being, since it might involve disorders that would be difficult to control. It is nevertheless regarded as probable that,

at the first favourable opportunity, closure will be effected in order to rehabilitate the diamond market.

During the second half of 1958 there were no European buyers on the spot. However, the Guinea Government, who plan the establishment of a diamond market, have approved of an expert who will be responsible for valuations for taxation purposes and probably also for the distribution of African production between four reputable firms.

It was reported in March, 1959, that a diamond market operating on the same basis as the Government Diamond Market at Accra, was to be opened at Kankan, about 150 miles north of Kérouané, and that 14 buying licences had been issued, two to firms operating at Accra.

The export duty on diamonds at the rate of 18 per cent *ad valorem* was thought to be too high and consequently encouraging to illicit exportation. The rate has recently been lowered to about 8 per cent by accountancy arrange-

ments. In reality, it comprises 5 per cent local mining tax and 5 per cent export duty which, at the present time, are cancelled when sale takes place; hence there remains in force, for diamonds of African production, only 5.80 per cent of T.F.R. tax and 2 per cent co-operative tax.

Changed Constitutional State

On September 28, 1958, in consequence of its negative vote on the French referendum, French Guinea automatically attained independence. It is obviously difficult to foresee the repercussions of this event on the position of European diamond mining companies in Guinea and on the implementation of plans for rehabilitating the African diggings and repressing the traffic in precious stones. In the light of recent experience, however, the author of the review fears that they will be unfavourable.

The Iranian Mining Industry

THERE is no doubt that Iran is a highly mineralized area but what is so often ignored is that the surface deposits, of copper and lead especially, have been exploited for 3,000 years. This fact should indicate that mines will not be found by cheap surface prospecting methods. Also during this long period the mining methods have not advanced and what is referred to as the "skill" of local miners is only too often a perpetuation of ancient mining technique, the reasons for which have been forgotten. Modern machinery in practically all cases is used to lighten the physical effort of labour using ancient methods, and not to develop new economic techniques giving higher productivity.

When considering Iran it must be remembered that the population of about 20,000,000 is better fed than the population of the surrounding countries but has been the least exposed to modern industrialization. This small population does not provide an internal market large enough to support basic industries and thus help the development of local ores. Hand labour is still comparatively cheap with regard to amortization of large scale mechanization, but there is not, as in most underdeveloped countries, an excess of it.

Problems of Management

Until 1935, when the government began actively to develop mining using foreign technicians and advisers, very primitive forms of mining were employed. It was normal practice to use the ancient system of sinking many closely spaced (10 to 30 metres) shafts and connecting them by equally closely spaced levels before removing as much of the ore as the miners were willing to risk. There is some evidence that very ancient mining used fewer openings, and

Since the last war, mining in Iran has caused considerable interest, there have been changes in government policy and now several false impressions are held. The author spent two and a half years in Iran as an independent consultant, when most of the country except Khusistan and Baluchistan was visited. This article is confined to general considerations, specific mineral deposits or geology not being dealt with. The timing of the article is significant in the opinion of the writer as the industry must soon "grow up" or disappear

certainly large pillar and stall stopes to over 50 metre depths have been seen. This was probably based on slave labour, however. The training of labour by foreign technicians, on which the German group in the Anarak area had the most effect, has had such marked effects on the men associated with them that it is surprising that it has not been repeated. Well timbered vertical shafts are now common and adit development almost too popular. However, systematic development, regardless of results in minor sections, and stoping practice are still very backward.

Iranians trained as mining engineers in Europe before the war, and who contributed to the advance in technical efficiency, were able to get some experience abroad before returning to their own country. Most of these engineers have been absorbed by administration. Present-day locally-trained engineers have, with a few notable exceptions, little chance to get practical experience of the scale of mining which requires to be developed. This, coupled with the dislike of using foreigners except in advisory capacities, is having serious effects on development. Engineers graduated from Tehran University have either to find other employment or manage mines which are truly run by the local foremen. Thus the impressing of modern techniques on labour cannot be done, especially when it is remembered there is an inborn social dislike of manual labour.

It should be realized that understanding of designs and reading are not sufficient training for mining engineers and the discipline of giving and taking orders is essential to management of a complex industry. Also, until the labour improves in handling modern machines, daily tonnages

By D. J. SIMMONS, B.Sc., A.R.S.M.

of Mackay and Schnellmann, London

cannot be increased, and while careful track-laying and efficient breaking of ground have little effect on the cost per ton of a 20 ton per day mine, they are important when more than 200 tons per day are required. The understanding of these ideas by the people concerned in mining is as important as the financial considerations mentioned below.

Position of Private Mining

While the government has been engaged in mining both through the Ministry of Mines and the Mining Department of the Seven Year Plan Organization, it has become obvious that the capital required to establish modern mines is too much for the government with all the other demands on the available money. Also the lack of a proper Geological Survey has become obvious, and this is just being remedied by the Ministry of Mines, while the Plan is drastically reducing its mining commitments.

Proposals for joint ventures of foreign companies with the government have always been welcomed and this has proved another point. Foreign companies with all the heavy risk capital required for opening up a mine in Iran at least require a reasonably assured tonnage of mineral to see them through the first phase. The government's disappointment in lack of continuing interest by foreign firms after an initial gratifying interest has led to the realization that money is better spent on mapping reserves than in making a small producing mine.

The two joint venture companies were both based on well outlined areas. That formed with Pennaroya to mine lead and zinc in the Arak area was based on far-sighted development by government engineers of old mines using deep adits which indicated reasonable tonnages to be available. That formed to mine chromite at Isfandegh north of Bandar Abbas was also based on a well prospected area investigated from a base on a moderate sized lens. Both these companies, with a certainty of some ore, were prepared to venture into the country, which they would not have done if they had been required to spend much money in preliminary prospecting and development. The advantage to the country has been that technicians to train labour have been provided, moderate sized mines have been built up, and systematic prospecting has discovered more deposits.

Private mining has mainly become important since the boom in metal prices caused by the Korean war, which was prolonged by the buying of lead/zinc ores at Caspian ports by Russia at prices above normal world prices. Luckily for the long-term future of the industry recent political trouble has closed this market, and, although it may well re-open, the facts of world mining have been impressed on local mine owners. Although the private chrome mines were started as a result of the high world price, several have continued by using increasingly efficient mining practice and aided by the excellent grade of the ore. Private coal mines compete favourably with the government ones but the small internal market, and lack of initiative (in most cases) to expand the market, limit their expansion.

The average businessman in the country looks for a quick profit and definitely a quick return of capital. Although preparatory work to prove ore before establishing beneficiation plants is understood, so few of these have been working that the equally important work to develop ore so as to insure a steady supply is not considered necessary. Signing contracts for the sale of ore is now seriously considered, as against the previous practice of selling in lots on the highest market, but fixed metal prices are required and a true appreciation of the business advantage cannot be reached with the present small

producers. Local industry cannot be expected to provide enough demand to start large mines for decades, but a strong export market could be built up with the emphasis on regular production. First of all the prejudice of local business in favour of high unit profits must be overcome.

Iranian mining law is on the whole far-sighted in principle. However, the tax-free period of five years is too short to develop medium-sized mines in a country where all services also have to be made at the mine. Also the lease period of 20 years is very short. Company law is not strongly enforced and, although possible in theory, any company not consisting of a family or a few excellent friends cannot function in practice. For mining the inability to secure certain option agreements is very serious. Far-sighted men willing to prospect other owners' leases exist but cannot work, since in the event of a useful discovery the option could easily be broken or be costly to implement.

This trouble with the implementation of local law is often serious in other ways. Local land-owners and peasants can be very troublesome and the power of the central government is not great enough to help except in the matters directly affecting law and order. This often causes unlooked for expenses to the miner, which might seriously alter the economics of operation, especially in the difficult initial stage where capitalization is already difficult to find. A tendency for the tax to be assessed on gross income for simplicity is very serious where miners are trying to run a large production at a small profit per ton. Finally the land survey practice is very poor indeed, and future trouble in conflicting leases is almost certain unless it is brought to normal world standards.

Changing Conditions

Local conditions are changing rapidly and most of all in the all-important way of communications. Any description is very quickly outdated. The road and rail network expands considerably each year. The railways to Meshed and Tabriz, as well as many miles of road, have been completed in the last three years. Transport will be a problem for many years in certain areas but road transport is available for nearly all mining areas. The building of Bandar Abbas as a new harbour will very much help the mining industry of the large area to the north as far as Nain. Water is always a problem on the industrial scale although saline water can be discovered by drilling, even over the desert regions. Power in almost all areas has to be supplied by the owner. Labour is seriously short in the central desert areas and in the north and west is liable to serious seasonal shortages due to agriculture. Provided capitalization allows the necessary buildings, however, a permanent labour force can be built in nearly all areas.

Apart from political difficulties due to the position of Iran, there are certain internal problems concerned with government which a foreign company must consider, but they are not insuperable. Local conditions are no more a serious hindrance than in many other parts of the world, but capitalization is seriously increased by them as compared to the more settled mining areas. The resistance to change of local labour and to some extent of local engineers is, however, a factor not normally seriously considered which can considerably increase costs mainly by extending time estimates. However, the government is generally helpful to foreign investment on the joint company basis and the mineral potential is definitely great. If government and private companies concentrate on prospecting, mapping and initial development it is certain that more interesting mines will be discovered which foreign capital would be interested to develop and thus provide the training of personnel to establish a flourishing local industry.

AUSTRALIA AND ALUMINIUM—II

ORE SUPPLIES FOR THE ALUMINIUM INDUSTRY

THE ability to meet expanding demand will depend primarily, of course, on availability of the raw materials from which aluminium may be extracted. The main raw material today is bauxite.

Not all of the 16,600,000 tons produced in the Free World and the 20,400,000 tons in the world as a whole in 1958 were required for the production of aluminium. Some is used for the manufacture of alumina abrasives, refractory bricks and cements, as a flux in the steel industry, and for such chemical purposes as aluminium salts for dyeing, tanning, water purification and medicines. There are no world-wide data, but of 7,632,683 tons of dried bauxite equivalent consumed in the United States in 1957, 91.3 per cent (6,967,819 tons) was used as alumina. An average of 2.267 tons of dry bauxite was required to produce one ton of alumina, and 1.908 tons of alumina to produce 1 ton of aluminium. Thus U.S. production of aluminium in 1957 would have required the equivalent of 6,362,000 tons of dried bauxite. In most countries, rather a higher grade bauxite is used than in the United States and the ratio is generally about 4 to 1. The total bauxite consumed for aluminium production in the Free World would have been about 11,500,000 tons on a dry basis.

The main increase in bauxite production during recent years has come from the Caribbean area, and output from that region is capable of further great expansion in the future. Production of bauxite in Europe has also increased considerably, but perhaps the main scope for increase in the near future is in Africa. By 1975, the world requirements for all purposes in terms of equivalent bauxite may well be in excess of 60,000,000 tons. Existing sources are well capable of meeting that tonnage.

Extending the Reserves

But bauxite reserves are only a part of the eventual world resources of possible aluminium ore. Already a U.S. aluminium producer, Anaconda Aluminium Co., has developed an economic process for the extraction of aluminium from high-alumina clays. Admittedly, suitable clays will not be unlimited, but they will enormously extend the material which will be acceptable as aluminium ore in the future. Nepheline syenites have also come into use as ores of aluminium, particularly in Russia where kyanite and sillimanite are to be mined for this purpose; in addition alunite clays, of which great reserves are known in China, are being used in Russia even now. The U.S. Bureau of Mines is at present doing research on the use of anorthosite.

Although the reserves of high-grade bauxite, as required for economic reasons by most alumina plants today, may suffice to last, say, only the remainder of this century, improved techniques will increasingly extend the reserves of aluminium ore into the field of these other materials. The scale of possible world resources of the future is stupendous, and perhaps approaches in extent the enormous iron ore deposits of the world, far transcending the likely reserves of base metal deposits. The tonnage of these aluminium resources is such that, for any conceivable production of aluminium in the years ahead, the reserves will last for many hundreds of years.

The growth of the primary aluminium industry this century has been the most spectacular amongst the metal industries. World aluminium production has expanded from 250,000

This is the second of three extracts from a paper presented at a symposium held in Brisbane on July 16 and 17, 1959, by the Australasian Institute of Mining and Metallurgy, Southern Queensland Branch, the Australian Institute of Metals, Brisbane Branch, and the Royal Australian Chemical Institute, Queensland Branch.

tons in 1935 to 3,500,000 tons today. During the most significant period, 1950 to 1956, the growth was at the rate of 250,000 tons per year in the Free World, or around 300,000 tons including Communist countries. Subsequent to 1956, recession led to a cutback in production in North America, but production continued to increase elsewhere. World production in 1958, including Communist countries, was of the order of 3,500,000 tons. The increase in the 1950's has been rather evenly distributed between North America, Europe and Communist countries.

During the latter part of 1956 and throughout 1957 a surplus of aluminium appeared in the United States; the three leading producers were able to take advantage of the terms of their contract and transferred 289,578 tons to government, presumably to stockpile — some further transfers were made in 1958.

The Capacity Potential

Now that consumption has resumed its upward trend, idle capacity is returning to use and aluminium reduction plants will tend to approach 100 per cent capacity. However, there are many new projects under construction, planned, or under consideration. Today, the capacity potential is nearly 50 per cent in excess of actual requirement. It is clear that, including Communist countries, present world capacity will amply suffice the world's probable needs until well into the 1960's. Thereafter, many of the new projects will come into production and world production capacity will be adequate up to 1970. Thus, during the next 10 years, aluminium consumers can safely go ahead with immediate expansion plans, with the full assurance that world supplies will be ample to meet requirements.

U.S. capacities on the Pacific Coast are: Alcoa 183,900 tons, Reynolds 135,700 tons, Kaiser 193,800 tons, Harvey

By
Dr. J. A. DUNN

48,200 tons, totalling 561,600 tons. Canadian capacity at Kitimat, British Columbia, is 246,400 tons. There may be some increase in capacity on the Pacific Coast in the future, but the largest increase will be at Kitimat, Canada.

The projected new capacities in the United States will certainly be increased in the 1960's. The greater part of the increase in Canada will be at Kitimat, British Columbia, although there will be further increases in Quebec. In South America the increase will be in Brazil and Surinam, but plans in Argentina, Venezuela and Peru have been mentioned. In Europe, new plants are projected in several countries, but mainly in France, Norway, Spain and Yugoslavia, and there are other projects which at present are merely under discussion. In Asia, the main increases will be in Japan, India, and perhaps Sumatra and Pakistan. In Russia, estimates range well in excess of a further 800,000 tons, but possibilities extend to satellite countries of which little has been said. China's potential will be great when it stirs.

The greatest scope for expansion, from the point of view of bauxite reserves and cheap power, is in Africa. The vast projects there will depend mainly on an expansion of world demand sufficient to justify their construction, and on the political reliability of these areas. The whole capital must necessarily come from Western Europe and America — the presently projected programme, around 750,000 tons in total, would require a capital investment of at least £800,000,000. That scale of investment for these schemes will need commensurate assurances against subsequent "nationalisation". Essentially, their one attractiveness is the vast hydroelectric power potential in the general region of the bauxite.

Alumina Supplies

Much of the world bauxite production continues to be shipped to alumina plants situated in the metal reducing countries; this trade is mainly from the Caribbean area to North America, and from the west coast of Africa to Europe and Canada. There is also trade between European countries, and from Malaya and Indonesia to Japan, Taiwan and Europe (and Australia).

The shipment of 40-50 per cent of impurities and water contained in the bauxite adds considerably to the cost of extractable alumina — the cost of alumina at the reduction site varies according to the locality of the alumina works and to such other factors as bauxite analysis, works costs, etc.; these factors determine whether preferably bauxite or alumina should be shipped. But national emphasis on treatment in the country of origin is leading increasingly to the tendency to ship alumina. A ton of alumina at over £stg.30 a ton is a better export revenue proposition than bauxite at £stg.2 to £stg.2 10s. a ton.

World production figures of alumina are not available in detail, but the tonnage of aluminium produced in each region in 1958 would have required approximately the amount of alumina listed in the accompanying table.

Had full reduction capacity been used, alumina requirement would have been very much greater.

Europe and the Western Hemisphere

Although there is a good deal of transshipment of both bauxite and alumina in Europe and Communist countries, these regions are more or less self-sufficient in alumina supplies for the present. It is expected that increased requirements in Western Europe will be met from increases in alumina capacity in Europe and by new projects in Africa. Concerning Canada, an alumina plant at Port Alfred, Quebec,

supplies Alcan's requirements in this area, treating bauxite from associated companies in British Guiana, Surinam and French West Africa. The Baie Comeau plant of Canadian British Aluminium Co. (parent company British Aluminium Ltd. in conjunction with Quebec North Shore Paper Co.) is also being supplied by Alcan for the present. The Kitimat plant, British Columbia, imports alumina from an associate of Alcan in Jamaica, and some also from an affiliate in Japan.

Alumina capacity in the United States is fully capable of meeting present metal production requirements, but falls short of requirements when U.S. reduction capacity is fully used. Any further alumina requirement will need to be met either from domestic increases or from imports. Part of the additional alumina requirement in the United States will come from associated or subsidiary companies overseas, particularly in the Caribbean region and perhaps in Africa.

In the Caribbean area new alumina plants are under construction in British Guiana, Surinam and Jamaica, and, by the early 1960's alumina capacity in this area will be well over 1,000,000 tons. These plants will supply further requirements of alumina in both Canada and the United States.

Capacity in Africa

Projects in Africa will add considerably to alumina capacity in the early 1960's. Bauxite du Midi, a French subsidiary of the Canadian company, Aluminium Ltd., at present mining bauxite on Isles de Los, plans to erect a 220,000 tons alumina plant to treat bauxite deposits near Boke, French Guinea. Cie Internationale pour la Production d'Alumina, a combine of French, British, Swiss, U.S. (Ormet) and German interests, expects to complete a 480,000 ton alumina plant at Fria by 1960. This alumina will find a market in Europe, U.S. and Belgian Congo, but will later supply the proposed adjacent aluminium reduction plant at Suapiti. Eventually, it is proposed to expand this alumina plant to 1,200,000 tons. There has also been talk of another large plant based on the extensive bauxite deposits in the Dabola area, east of Fria.

An alumina plant is projected in French Cameroons, based on local deposits of bauxite and on natural gas at Logbaba. Alumina production would also be associated with the proposed Ghana and Belgian Congo reduction plants.

Other Areas

In Asia, all present and projected reduction plants are based on associated adequate alumina capacity. In Japan alumina production is surplus to domestic requirements and shipments are made to Canada and U.S.—one of the Japanese producers is affiliated with Aluminium Ltd.

In Australia, the present alumina capacity at Bell Bay will suffice for such probable expansion of production at that locality as has been mentioned.

World Alumina Requirements for Aluminium Production (000's l. tons)
Based on capacities as at present projected

	1958	as at present projected
U.S.	2,700	5,000
Canada	1,150	2,800
South America	17	430
West Europe	1,300	2,050
Africa	40	1,650
Asia	200	400
Australia	25	40
Total Free World	5,450	12,400
Communist sphere	1,300	3,200
Total World	6,750	15,600

Machinery and Equipment

Combined Aftercooler and Anti-Surge Tank

Holman Brothers Ltd., have produced a combined aftercooler and anti-surge tank for medium output stationary air compressors, which provides a greatly improved method of cooling large quantities of compressed air after it leaves the compressor and before it is put to use. The new unit is designed to handle 525 cu. ft. of air p. m. (14.87 cu. m.) at a maximum pressure of 150 lb./sq. in. It is compact and simple in design employing a four-pass system for the air flow. The cooling elements are "U" tubes, constructed from highly finned copper or copper alloy tubing expanded into a fixed tube plate, through which the cooling water passes. Advantages gained from this system include accessibility and replacement of a cooling tube without disturbing the remaining sets, which obviates the fitting of a second or sliding tube plate, as used in most designs.

Included in the unit is an anti-surge tank which eliminates air surges and consequent vibration in the pipelines, often caused through intermittent delivery from reciprocating type compressors. The chamber acts as a cushion in discharge, and with the anti-surge plate, ensures an even flow of air to the aftercooler tubes free from pulsations and also decreasing the noise.

When working to full capacity the aftercooler requires 16 to 18 gals. of water p. m. (73/82 litres).

FURNACE FOR ALUMINIUM AND ZINC ALLOYS

Progressive die foundries have long recognized the need for a furnace combining a high standard of metallurgical and temperature control with ideal working conditions for the diecasters. The Morgan Crucible Co. Ltd., and Birlec Ltd., have co-operated to produce such a furnace, the Birlec-Morgan Electric Die-Casting Furnace Type EDF Mark



2. This is an electrically heated crucible furnace combining the metallurgical advantages and the flexibility of crucible melting with the precise temperature control, automatic operation, cleanliness and good working conditions attendant upon electric heating.

The EDF is a holding furnace of 300 lb./135 Kg. aluminium capacity for metal temperatures up to 800 deg. C. It is primarily intended to be fed with

Above is the Parker Loadascreen at Evenwood, Co. Durham. Below is the Holman combined aftercooler and anti-surge tank

liquid metal from a melting furnace. If desired, the furnace can melt its initial charge and also has a melting throughput of 120 lb. aluminium an hour. The furnace operation with accurate temperature control is completely automatic. The diecaster is completely relieved of the necessity of attending to the furnace.

The nominal rating of the furnace is 30.5 kW. and the standard unit is suitable for direct connection to a 3-phase, 50 cycles electricity supply of between 400 and 440 v. The automatic control of the metal temperature is by means of a constantly immersed thermocouple. This is protected by a refractory sheath coupled to a temperature indicating controller of the millivoltmeter type. A second safety controller with the thermocouple in the furnace chamber restricts the element temperature.

MOVIGRAPH CHARTS USED BY COLLIERY MANAGERS

Since the first Movigraph manpower control chart to be used by a colliery manager was installed some 18 months ago in Celynen South Colliery, pits in England, Scotland and Wales have installed more than 50 similar charts to deal with this problem alone.

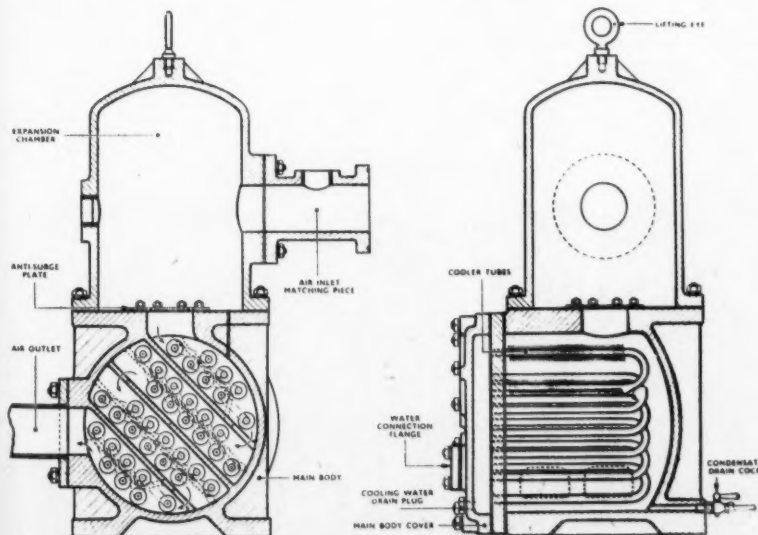
Manpower control is one of the most important uses of the Movigraph system in the coal mining industry with special attention paid to the trainee position. The left hand side of the chart shows the total number of men engaged in major operations at the coal face or on district services. To the right is shown absenteeism and variation against standard.

Movigraph is also used in collieries for such problems as plant location, accident statistics and dust suppression.

SCREENING HARD COKE STOCKPILES

To meet demands from industries asking for coke of a specific size, Sadler and Co. (Coke Ovens) Ltd., have installed a portable conveyor with vibrating screen at their coking plant at Evenwood to screen hard coke stockpiles.

The coke is fed from the stockpiles on to a band loader and from there on to a Loadascreen, the portable conveying and screening plant made by Frederick Parker Ltd. The vibratory screen separates the large coke (used for industrial purposes) into one lorry and the smaller sizes (used for domestic purposes) into another. The Loadascreen at Evenwood is capable of dealing with 1,200 tons in a 48-hour week.



Forecasting developments in Israel for the coming year, Director-General Menahem Bader, Ministry of Development, has stated that government plans included the expansion of production at the Timna Mines.

Comparing the first six months of 1958 and 1959, new capital investments in the Brazilian mining industry increased this year by 301 per cent, to 93,300,000 cruzeiros; 33,000,000 were contributed by new organizations as compared with 13,500,000 in 1958. The sustained interest in mining activities is indicated by the fact that one daily issue of *Diário Oficial*, that of August 29, published 15 decrees granting licences to prospect for minerals.

Federal Uranium Corporation has reported development of a substantial silver orebody of commercial grade at the Conjecture Mine, in northern Idaho, U.S.A.

The new plant of Companhia de Acumuladores Prest-O-Lite is about to start operating at Santo Amaro da Purificação, Bahia, producing 14,400 tons of metallic lead annually from ore of the Boquirá mine with 20 to 50 per cent zinc.

A mission which recently visited Argentina, Uruguay and Brazil to survey prospects for establishing markets there for coal and coking coal produced by Wankie Colliery in Southern Rhodesia, reported that South America was rapidly becoming self-sufficient as far as energy requirements were concerned. The view was also expressed that the acute shortage of foreign exchange of South American countries would militate against their importing South African coal at the present time.

A fleet of new International crawler tractors and construction equipment was recently delivered to John Lysaght's Scunthorpe Works Ltd., by R. Cripps and Co. Ltd. The machines, transported from Nottingham to Scunthorpe in road convoy, included Doncaster-built LTD-20 tractors powered by 124 B.H.P. Rolls-Royce diesel engines, as well as the now universal LTD-6. The big crawlers were accompanied by matching Sterling 1014 scrapers and cable control units; the smaller LTD-6 being fitted with hydraulic bullgrader equipment. Overburden stripping at Lysaght's Flixborough mine is a year-round task to enable continuous production of the high grade self-fluxing ore which is fed direct to the adjacent Normanby Park steel works. For this work the 1014 scrapers have been fitted with sideboard extensions giving an increased heaped capacity of 15½ cu. yds. It had been the intention originally to use an International TD-18A to push load the scrapers but the LTD-20's have proved more than adequate for self-loading. The photograph shows the scrapers being filled to overflowing, digging time being about 65 seconds

MINING MISCELLANY

Companhia Niquel do Brasil produced 288 tons of ferrous-nickel in 1958, with 25 per cent nickel and less than 1 per cent carbon and 0.3 per cent silica. The company has imported equipment from Germany to raise output to 350 tons, with 42 per cent Ni in 1960. When power from the hydro-electric station at Furnas becomes available capacity will be raised to 1,000 tons of ferrous-nickel with 420 tons of pure nickel. The company holds a concession to exploit the garnierite deposit of Niquelandia, with reserves of over 2,000,000 tons of 4.5 to 16 per cent Ni.

The Welkom Village Management Board has received an application from the Transvaal and Orange Free State Chamber of Mines for a site to establish a depot for training mine fire fighters on the Free State goldfields. At present all training is done in Johannesburg at the central rescue station of the Chamber. It is intended to train proto teams which would serve the Free State and Western Transvaal area.

A three-man Japanese copper mining survey team arrived earlier this week in Australia, to investigate the possibility of investing in copper mining at Ravenshorpe, in the south of Western Australia. The team, which will conduct a one-month survey, is representative of the Mitsui Metal and Mining Co., the Dowa Mining Co., and the Nippon Mining Co. This is the first Japanese survey sent to the Australian copper mines. Japanese copper producers have been asked to invest about £159,000 in the Ravenshorpe Copper Mining Co.'s

shares to aid the company's expansion programme.

A Birmingham company has been awarded an overseas contract worth £9,000 for coal cutting equipment of a revolutionary type. The contract follows the demonstration of the new equipment at the International Inventors' Exhibition at Brussels in March this year. The company, A. P. Fischer Ltd., showed a self-reversing coal cutting pick at the exhibition and have now signed a contract to supply a Belgian coal mining company.

PERSONAL

Dr. C. A. Anderson has been appointed administrative geologist and chief of the Geologic Division, United States Geological Survey.

Mr. William Broadbent is retiring on September 30, 1959, as managing director of Robert Broadbent and Son Ltd., after 68 years' service with the company. His place will be taken by Mr. M. H. Applegate, who has been appointed general manager from October 1, 1959, and Mr. Norman Broadbent will continue to serve the company as technical director.

Mr. William Macmillan MacLeod has been appointed a director of Sungei Besi Mines Ltd.

Dr. Carleton C. Long, Director of Research, St. Joseph Lead Co., has been elected president of the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers.

Dr. J. A. Dunn, who recently retired as Chief Mineral Economist, Bureau of Mineral Resources, Geology and Geophysics, Australian Department of National Development, has become a consultant in Melbourne. His new business address is 11th Floor, Temple Court, 422 Collins Street, Melbourne. Dr. Dunn informs us that, much of his past work having been of an international character, he is equally at the disposal of U.K. and other overseas concerns as well as Australian.



Metals and Minerals

Lower U.S. Aluminium Orders

During the first half of 1959, U.S. domestic production of primary aluminium increased by 24 per cent over the volume reported for the similar period in 1958, reports the Bureau of Mines. At 942,398 s.tons, it compared with 762,561 tons in January-June, 1958. Sales and consumption during the first half of this year amounted to 999,872 tons, exceeding production during the same period by approximately 57,400 tons. As a result of the heavy level of shipments, producer inventories of aluminium were reduced to about 89,000 tons as compared with 175,000 tons at the end of January, 1959.

A notable trend during the first half of the current year was a clearly defined increase in commercial demand. During the first six months of 1958 some 30 per cent of the total of 765,607 tons shipped or used by the primary producers went to the government under defence expansion contracts. In the first half of 1959 government acquisitions under this heading accounted for only 33,949 tons or a little more than 3 per cent of the total distribution of 999,872 tons.

Hopes of a record fourth quarter after an anticipated levelling off during the second quarter have been dampened by the prolonged steel strike, which has begun to be reflected in lower aluminium orders. One reason is that steel and aluminium are closely linked, another that disruption of such a basic industry as steel must inevitably react on other industries, and a third is the sensitivity of the aluminium industry to economic conditions as a whole.

Where the effects of the steel strike are becoming especially noticeable is, of course, in those fields where fabricators are consumers of both aluminium and steel. In view of the adequate supply of aluminium and the industry's high level of production, such consumers see little reason to build up stocks of aluminium until new supplies of steel become available. So far the aluminium industry appears to have received no benefits from the steel strike to offset these losses, but if the stoppage goes on much longer there is bound to be growing interest in aluminium in such fields as building ductwork, where it could be used in place of steel.

Meanwhile, the possibility of a strike in the aluminium industry itself, has by no means been dispelled. Negotiations between the Steel Workers Union and Alcoa, which were resumed on September 17 after a pause of more than a fortnight, have been recessed again until October 6. No reason was given for the action. Alcoa's contract with this Union, as well as with the United Auto Workers and the Aluminium Workers International Union, expired on July 31, but has been extended until October 31 or until the steel strike is settled, whichever is the sooner.

Adding to the problems of producers is the question of prices. Since the termination of the guaranteed pricing policy for primary aluminium, quotations have been on the basis of "price in effect at the time of shipment", and the industry has given a firm indication that an increase in price will be necessary regardless of the outcome of the suspended wage negotiations. On the other hand, the advantages of a rise in

basic prices require to be weighed against the stiffening competition from other metals and also against the threat of rising imports, which is becoming of increasing concern to domestic producers.

Alcan's total aluminium production which currently has been running at the rate of 500,000 tons a year is now to be raised by 33,000 tons in response to the better demand which is now being experienced both in America and elsewhere. Output will, however, still be well below rated capacity, which for its Quebec and British Columbia smelters together stands at 770,000 tons. U.S. aluminium production has, of course, been at a high level throughout this year and was reported to have reached an all time peak during the second quarter.

TITANIUM IN AIRCRAFT FRAME

The frame of the new 585 m.p.h. Douglas DC-8 jet airliner, which made its first commercial flight this month, contains half a ton of titanium. This is claimed to be the most significant use to date by a commercial aeroplane of the weight-saving and permanent corrosion-resistance properties of titanium metal in areas other than jet engines. According to Douglas Aircraft Co., Inc., the weight saving gained through the use of titanium is equivalent to five passengers and their luggage for each of the 5,000 flights each DC-8 is expected to make during its seven-year write-off period. The potential earnings so achieved are placed at \$525 for each coast-to-coast flight.

Titanium's outstanding qualities as a material for aircraft construction are underlined by the disclosure earlier this month by Pratt and Whitney Aircraft that the millionth flight-hour had been rung up on more than 5,800 engines containing titanium components without a single failure of any titanium part, either through corrosion or mechanical damage.

OUTLOOK FOR CANADIAN URANIUM

Atomic Energy of Canada has released a report by its economist, Mr. S. W. Clarkson, which states that the Canadian uranium industry should be prepared for the possibility of a severe contraction of production in 1963. The report notes that the key to Canadian production is contracts with the U.S. Atomic Energy Commission, which expire in 1962. It therefore emphasizes that, on grounds of mutual defence, interest and economic stability, the Canadian Government must continue to press for an early decision from the U.S. on the possibility of post-1962 purchases of Canadian uranium.

It is noted that the Canadian uranium industry has contracts for about 15,000 tons up to the end of March, 1962. In the following year the Commission is committed to purchase 2,000 tons and the U.K. about 5,000 tons. At the present time, therefore, the industry is assured of a market in 1962 for slightly more than half the current output. There is very little indication of firm sales contracts for 1963 and the following years.

Mr. Clarkson stresses that the U.S., the U.K. and Euratom will not have an immediate requirement for Canadian uranium when the present contracts ex-

LONDON METAL AND ORE PRICES, SEPT. 24, 1959

METAL PRICES

Aluminium, 99.5%, £180 per ton	Iridium, £23/£25 oz. nom.
Antimony	Lanthanum (98/99%) 15s. per gram.
English (99%) delivered, 10 cwt. and over £190	Manganese Metal (96% - 98%) £245/£250
per ton	Magnesium, 2s. 3d. lb.
Crude (70%) £190 per ton	Nickel, 99.5% (home trade) £600 per ton
Ore (60%) bases 19s. 6d./20s. 6d. nom. per unit, c.i.f.	Osmium, £21/£23 oz. nom.
Arsenic, £400 per ton	Osmiridium, nom.
Bismuth (min. 1 ton lots) 16s. lb. nom.	Palladium, £6 10s./£7 10s.
Cadmium 9s. 0d. lb.	Platinum U.K. and Empire Refined £28 10s. oz.
Cerium (99%) net, £16 0s. lb. delivered U.K.	Imported £263/£275
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.	Quicksilver, £711/£72 ex-warehouse
Cobalt, 14s. lb.	Rhodium, £41/£45 oz.
Germanium, 99.99% Ge. kilo lots 2s. 5d. per gram	Ruthenium, £18/£20 oz. nom.
Gold, 250s. 34d.	Selenium, 50s. 0d. per lb.
	Silver, 79d. f. oz. spot and 78½d. f'd
	Tellurium, 18s. lb.

ORES AND OXIDES

Bismuth	60% 8s. 6d. lb. c.i.f.
Chrome Ore—	18/20% 1s. 3d. lb. c.i.f.
Rhodesian Metallurgical (semifriable) 48%	(Ratio 3:1) £15 15s. 0d. per ton c.i.f.
" Hard Lumpy 45%	(Ratio 3:1) £15 10s. 0d. per ton c.i.f.
" Refractory 40%	(Ratio 3:1) £11 0s. 0d. per ton c.i.f.
" Smalls 44%	(Ratio 3:1) £14 0s. 0d. per ton c.i.f.
Baichistan 48%	(Ratio 3:1) £11 15s. 0d. per ton f.o.b. nom.
Columbite, 65% combined oxides, high grade
Fluorspar—
Acid Grade, Flotated Material £22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF ₂) 156s. 0d. ex works
Lithium Ore—
Petalite min. 34% Li ₂ O 40s. 0d./45s. 0d. per unit f.o.b. Beira
Lepidolite min. 34% Li ₂ O 40s. 0d./45s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li ₂ O £25 0s. per ton f.o.b. Beira
Magnetite, ground calcined £28 0s./£30 0s. d/d
Magnetite Raw (ground) £21 0s./£23 0s. d/d
Manganese Ore Indian—
Europe (46% - 48% basis 57s. 6d. freight
Manganese Ore (43% - 45%)
Manganese Ore (38% - 40%)
Molybdenite (85%) basis 8s. 11d. per lb. (f.o.b.)
Titanium Ore—
Rutile 95/97% TiO ₂ (prompt delivery) £29/£30 per ton c.i.f. Aust'n.
Ilmenite 52/54% TiO ₂ £11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) 162s. 6d./167s. 6d. per unit c.i.f.
Vanadium—
Fused oxide 95% V ₂ O ₅ 8s./8s. 11d. per lb. V ₂ O ₅ c.i.f.
Zircon Sand (Australian) 65 - 66% ZrO ₂ £16/£17 ton c.i.f.

pire. It is accordingly suggested that Canadian producers and government agencies should conduct a united, intensive and widespread selling campaign throughout the world. A further recommendation is that the industry should encourage the development of reactors fuelled with natural uranium as offering the best hope for the growing civilian market for Canadian uranium. Finally, the report urges that Canada, as the nation having the largest stake in the international uranium market, should press for a decision and early agreement on a control and inspection system for military nuclear production.

G.S.A. SELLING TITANIUM SPONGE

The General Services Administration has announced that it will offer for sale within the next six weeks 35,120 lb. of experimental titanium sponge, acquired from the Bureau of Mines under the D.P.A. programme, and now surplus to its requirements. The sponge has a brinnell hardness of 170 B.H.N., or above, and is being offered in one lot f.o.b. Boulder City, Nevada.

WOLFRAM PRICE UNCHANGED

For the past week the London shipment price for wolfram ore has remained unchanged at 162s. 6d.-167s. 6d. per 1-ton unit, c.i.f. Europe for minimum 65 per cent material. Dealers report that demand is now dormant and, until some

fresh business is concluded, prices must be regarded as largely nominal. Buying interest in ferrotungsten has tailed right off.

NEW BERYLLIUM VENTURE

Much research has been directed towards processes for the extraction of beryl from known low-grade deposits, but the economics of the methods so far available is such that their commercial development must await an increase in the price of beryl. Up to the present no method of concentration, separation or flotation has worked on a commercially-sound basis, apart from the traditional method of hand sorting. A new flotation process which, it is claimed, may make feasible the development of vast reserves in the U.S. has been announced.

The announcement states that Rado-rock Resources, Inc., and its parent company, Federal Uranium Corporation, have joined with Lisbon Uranium Corporation and Hidden Splendour Mining Co., in a new beryllium mining and milling venture. The four companies have formed a subsidiary, Dynamic Metals Corporation, which has obtained exclusive right to a new reagent which apparently has the specific ability to float beryl free and clear of other materials. The four firms have also formed a second company, Beryllium Resources Inc., to acquire beryllium ore properties and conduct explorations and development and mine activities. Some properties already have been acquired.

½ c. per lb. to the equivalent of 28.575 c. per lb. New York or Antwerp. It has also been realized that the Chilean copper production is going to show considerable improvement this year over 1958. The figures for the mines operated by the Braden Copper Co. and Anaconda for the period January to August show a production of 329,000 tons, an improvement of 74,000 tons over the same period last year.

TIN'S WEAKER UNDERTONE

The tin market has developed a weak undertone in face of possible additional tonnages becoming available at the beginning of a new quota period, and also owing to a realization that the consumption of metal in America may be curtailed owing to the long duration of the steel strike.

The London market is also fluctuating between a backwardation and a contango and it is believed that the Buffer Stock Manager has continued to sell metal, although probably most of it has been on account of the British Government. Stocks in warehouse were practically unchanged at 8,560 tons.

On Thursday the Eastern price was equivalent to £811½ per ton c.i.f. Europe.

LEAD-ZINC STILL IN STEADY TRADE DEMAND

The lead market remains friendless and the spot price broke the £70 per ton mark with the expectation that prices will continue to decline. Trade demand remains reasonably good but, as has been pointed out before, there is still a considerable surplus of production over consumption and this must be reflected in the free market. Although the American market is isolated, sentiment was also affected by the settlement of the U.S. Smelting and Refining Co.'s lead refinery strike at East Chicago which had lasted since June 15 and, at the same time, a further extension of the old contract at the Bunker Hill Co. kept the plant in operation.

The easier undertone in the zinc market, which developed more in sympathy with the other metals than for any reason of its own, was strengthened sentimentally by the rise in the U.S. price of zinc to 12 c. per lb. East St. Louis by the St. Joseph Lead Co. and it is expected that this price will become general. In Europe, demand remains steady and as can be deduced from the continuance of the backwardation, nearby metal is not easy to come by.

Closing prices are as follows:

	Sept. 17 Buyers Sellers		Sept. 24 Buyers Sellers	
COPPER				
Cash	£226½	£227	£227	£227½
Three months ..	£228	£228½	£227½	£228½
Settlement ..		£227		£227½
Week's turnover	12,125 tons		7,300 tons	
LEAD				
Current ½ month	£70½	£71½	£69½	£69½
Three months ..	£72½	£72½	£71	£71½
Week's turnover	6,725 tons		7,625 tons	
TIN				
Cash	£793	£793½	£793	£793½
Three months ..	£793½	£794½	£790½	£791
Settlement ..		£793½		£793½
Week's turnover	795 tons		530 tons	
ZINC				
Current ½ month	£86	£86½	£85½	£85½
Three months ..	£85	£85½	£84½	£84½
Week's turnover	4,450 tons		3,850 tons	

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Interest in all the markets remained at a very low ebb last week with most operators being content to watch from the sidelines. As a result of this, and as a fuller realization spread of the probable effects on the American economy of the steel strike, prices sagged and the undertone remains extremely uncertain.

LIFELESS COPPER MARKET

The copper market still remains dominated by the strike situation in the U.S. with the present negotiations in Chile being an added factor of uncertainty. As forecast last week, the negotiations at Butte broke down and these have now been replaced by meetings between representatives of the Union and Kennecott; although no optimism is expressed, there seems to be a slightly better chance of these negotiations paying the way for a general settlement in the copper strike. In Chile, the course of negotiations between the unions and the Braden Copper Co. has not been

smooth and permission has been given for a strike vote to be taken on the 24th. It is emphasized, however, that this does not necessarily mean that a strike will take place; the majority of informed opinion considers that a peaceful settlement will be reached.

Prices in the U.S. have tended to decline and dealer copper can be obtained at a price slightly below Amco's selling price of 33 c. per lb. Kennecott continues to supply copper ex-warehouse at 30 c. per lb., whilst those producers operating are charging 31½ c. per lb., which is also the price for Anaconda's Chilean copper sold in the U.S.

The London market has been lifeless with prices declining and the contango has been maintained in spite of a sizeable reduction in stocks of 1,850 tons last week, the total now standing at 12,813. Demand in Europe is merely of a routine nature with buyers showing a tendency to purchase when necessary or when a cheap parcel is on offer. The Belgians reduced their copper price at the end of last week by approximately

U.K. METAL STATISTICS

The British Bureau of Non-ferrous Metal Statistics offered the following figures for July (in 1,000 tons), June figures in brackets:

Consumption of copper totalled	44,572	(56,112)
Stocks of Refined and Blister Copper totalled	81,986	(80,361)
Usage of lead totalled	26,851	(30,099)
Stocks at the end of the month amounted to	67,586	(57,810)
The offtake of zinc totalled	26,318	(30,221)
End of month stocks were	37,427	(38,297)
Tin offtake was	1,682	(1,987)
Stocks at the end of the month amounted to	11,255	(9,638)

Mining Finance

Western Areas on Ground Floor Terms

'Details of the financing arrangements for Johnnies' new flotation, Western Areas Gold Mining, have now been made public. Western Areas is to have an authorized capital of £8,270,000 in 10s. shares. Of the 16,540,000 shares thus authorized, about 14,500,000 are already held in fully or part-paid form, by the various companies interested in the flotation. The most important of these companies are J.C.I. (13.3 per cent of Western Areas' equity) Anglo American (3.1 per cent) Freddie's (2.7 per cent) Union Free State (2.3 per cent) New Union Goldfields (1.9 per cent) and General Mining and Union Corporation (1.7 per cent each). Other companies, including Rand Mines, Selection Trust, Rooderand and West Wits have subscribed for proportions ranging from 1.5 per cent downwards.

To begin with, the market will consist of the remaining 2,112,264 shares which are now to be offered at par to shareholders in Anglo-Rand (one-for-ten), Rooderand (one-for-ten) and Freddie's (two-for-five). There is also the possibility of a house tap, supplied by the 5,416,662 fully paid shares already subscribed (included in the percentages above) although this would presumably be kept closed until the mine is well and truly launched, unless, of course, a runaway speculative position appeared to be developing in an understocked market.

It would seem, therefore, that Western Areas is following the trend, recently becoming more apparent, towards the public flotation of properties at a later stage in their development than was formerly the case. The use of partly paid shares forms an integral part of the scheme,

making it possible for Western Areas to reach production without either coming to the market more than once, raising loan capital, or straining the sponsoring companies' resources years before any results can be seen.

Most of the technical details of the new mine have been known for some time (*The Mining Journal*, September 4, 1959). One novel feature is the fact that there are no immediate plans for Western Areas to build its own mill. Initially, at least, the ore hoisted through Western Areas 200,000-ton-per-month shaft will be sent to the nearby Randfontein plant for milling at the rate of 50,000 tons per month. Randfontein, of course, as a dying mine, will be glad of the opportunity. At a later date the question of building a mill will be reconsidered, as will the question of expansion to the full shaft capacity.

Two shafts are to be sunk, and in the picture below the foundations for the 26-ft. main shaft are being poured. In the background, 230 ft. away, is the temporary headgear of the 22-ft. ventilation shaft, with precementation rigs on either side. It is planned to complete precementation before the commencement of full-scale sinking.

There is every good reason to believe that the flotation will be a thumping success. Assuming the grade milled to be about 5½ dwt., and costs about 47s. per ton, the milling of 50,000 tons each month would allow dividends, after full tax and lease of about 4s., representing a price of about 18s. now, even allowing for a lengthy waiting period. It is impossible to put an accurate value on the expansion possibilities at the present

time, but an initial price of 20s.-22s. 6d. would be quite realistic. The Rooderand, Anglo-Rand and Freddie's shareholders could well be getting an extremely good bargain.

ROODERAND TO REORGANIZE

One of the companies participating in the Western Areas flotation is simultaneously reorganizing its own affairs. This is Rooderand Main Reef, a member of the Anglo-Transvaal group, whose main asset, apart from its Western Areas rights and share, is a large block of Freddie's Consolidated £1 shares, which over the years have proved a liability by necessitating constant appropriations against their declining market values. Rooderand holds several interesting areas of land, but the company's lack of resources has made it extremely unlikely that they could be exploited without considerable help from the parent organization.

As a remedy for this situation, Rooderand shareholders are to be offered a package deal at an Extraordinary Meeting to be held on October 16. If the relevant resolutions are passed, Middle Wits, another Anglovaal company, will buy approximately 87½ per cent of Rooderand's assets remaining after Rooderand has distributed to its shareholders its Western Areas rights and most of its Freddie's Consolidated shares (the latter in the proportion of one-for-five). Purchase consideration Middle Wits shares, to be passed on to Rooderand shareholders in the proportion of one-for-five. The final position would be that each Rooderand shareholder would receive in full satisfaction of every ten Rooderand shares two Middle Wits shares, two Freddie's Consolidated shares, and the right to one Western Areas share. Middle Wits would own 87½ per cent of Rooderand's former assets, while Rooderand, left with a 12½ per cent rump, would be a wholly-owned subsidiary of Middle Wits. In spite of its complication the scheme seems to be a good one from all points of view.

GEEVOR: CALL FOR TAX RELIEF

There can be no doubt but that one of the most important factors in the decline of the Cornish tin industry has been the unenlightened taxation policy followed by successive governments. Geevor Tin shareholders hardly need to be reminded of this—out of their company's gross profit of £74,534 last year, shareholders received £37,000 odd, while the government took just over £35,000. This level of taxation is severe enough for companies engaged in non-extractive industries; for a firm dependent on an uncertain and diminishing asset like a mine, it can be crippling.

Mr. Simms, chairman of Geevor, is one of Cornwall's most persistent agitators against this inequitable situation, and he makes no apologies for again devoting the "meat" of his circulated statement to this problem. Indeed, this year Mr. Simms has more reason for complaint than ever, because while taxation generally was reduced by 9d. in the last Budget, in the case of mines this was more than offset by a change in rating methods, which has resulted in a 100 per cent increase in the level applicable to Geevor.

On the brighter side, Mr. Simms was



able to say that the mine was still responding satisfactorily to lateral development. Nevertheless, this could not be expected to continue indefinitely.

NEW REFINERY FOR INDIAN COPPER

At the annual meeting of Indian Copper Corporation in Calcutta last Wednesday, Mr. P. E. G. W. Parish, the chairman, revealed that the corporation was now ready to go ahead with its plans for a £700,000 electrolytic copper refinery. At present all the metal produced in India, amounting to some 8,500 tons per annum, is fire-refined by Indian Copper. The remainder of India's requirements, amounting to a further 55,000 tons, is imported as metal. It is thought that the cost of the new refinery can be met from within Indian Copper's resources, and the project will be put in hand as soon as government approval is received.

It would appear that the purpose of the new project is to produce a more marketable product, rather than to ex-

pand India's smelter capacity. Indeed, it is becoming more and more difficult to maintain ore supplies to the present smelter, and Indian Copper has been intensively prospecting its lease area in an attempt to find new sources to replace the rapidly depleting orebodies now being worked. Statement page 299.

CAPITAL REPAYMENTS FROM BRAKPAN, SPRINGS

The trend towards later flotations referred to previously is matched at the other end of the time-scale by a trend towards earlier capital repayments. Until this week, Anglo American has stood apart in this respect, but Springs and Brakpan, the mines in this group nearest to break-up, have now announced their intention to begin repayments.

Both of these companies are to follow recent precedents in reducing the nominal value of their shares to 3d. This obviates the necessity of passing special resolutions and obtaining court permission each time it is wished to make a payment.

FINANCIAL NEWS AND RESULTS IN BRIEF

Satmar Preliminary Figures.—Earnings of South African Torbanite Mining and Refining (SATMAR) rose sharply in 1958-9 from £98,590 to £147,738 in 1957-1958, both figures before tax. Taxation absorbed £54,000 against £24,550, and after providing £86,680 for the proposed dividend of 7½d. per share (against 6d.) the carry forward is increased from £51,112 to £58,170.

Anglovaal Charterland Prospecting.—In his statement to shareholders of North Charterland Exploration Co. in Salisbury, Sir Peter Bednall, the chairman, said that the prospecting operations by the Anglovaal Charterland Exploration Co. had continued during 1958. No payable mineralization had been discovered, but the general plan was continuing to be executed. Some modification of the agreement might be necessary to cover minerals not already provided for.

Kwahu's Doubled Dividend.—Kwahu Mining Co., the old West African gold producer which has become an investment holding company, had its most successful year to date in 1958-9. Dividends and interest received rose to £32,711 from £20,693, and share dealing profits were almost £20,000 up to £23,805. Net profits were almost trebled at £48,047 compared with £17,625, from which £25,000 has been appropriated to reserves, leaving sufficient to double last year's distribution of 15 per cent. The carry-forward is increased from £8,101 to £9,430. Meeting, October 22.

Broken Hill South Recovery.—In the year to June 30 last, Broken Hill South earned a consolidated net profit of £890,746 after tax and royalty, showing some recovery from the previous year's £611,085. A dividend of 5d. per 1s. share has been declared, making a total of 9d. for 1958-9, compared with the equivalent of 8 2/5d. in 1957-8.

New Discount House for Rhodesia.—The Anglo American Corporation and

Smith St. Aubyn and Co. (a member of the London Discount Market Association) have sponsored the formation in Rhodesia of a new discount house, British and Rhodesian Discount House. Other prominent banking and financial institutions in Rhodesia and the U.K. are associated with the venture.

Kinta Kellas Results.—In spite of the effects of output restriction, Kinta Kellas Tin Dredging managed to make a profit of £2,092 in the year to March 31 last. This result was achieved, however, by charging only the actual expenditure for repairs during the year and making no provision for wear and tear. The dividend is to be passed. Results during the current year are stated to be better, but it remains to be seen whether a dividend will be possible. Meeting, London, October 8.

Idris Scrip Proposals.—As already announced, Idris Hydraulic Tin proposes to bring its issued capital more into line with the value of the assets employed in the business. A three-for-one scrip issue is proposed, followed by a consolidation of every two 1s. shares into one share of 2s. The company emphasizes that the proposed issue carries no implication with regard to dividends. An E.G.M. is to be held on October 14 to consider the proposals.

Pengkalen, Too.—Pengkalen, one of the Redruth group of Malayan Tin Companies, is proposing similar action to Idris. A scrip issue, in this case of four-for-one, will be made, subject to shareholders' approved at an E.G.M. on October 28, followed by the conversion of the 1s. shares into 2s. shares.

Clutha River Earnings Halved.—Preliminary figures issued by Clutha River Gold Dredging indicate that the company's net profit after all charges in the year to March 31 last was reduced to £3,864 from the previous year's total of £7,160. The dividend is nevertheless to be maintained at 5 p.c. absorbing £5,104.

MARKET HIGHLIGHTS

The South African Gold share market roused little enthusiasm this week. The usual Cape buying enthusiasm waned considerably in face of London's complete indifference to gold shares in these pre-election days. It was also thought that the persistent dullness on Wall Street might have resulted in the U.S. selling of some of its recently acquired Kaffir holdings, but there was little proof for the theory. In fact, selling at no time was on any significant scale; it was just a question of prices drifting lower for want of buying support.

O.F.S. share prices suffered most, Free State Geduld being particularly depressed with a fall of 7s. 6d. to only 175s. "Ofsits" reflected the trends of the group as a whole with a loss of 3s. 1½d. to 108s. 9d. One of the very few exceptions was provided by President Brand which managed to rise 1s. 3d. to 75s. 3d. following the chairman's forecast that the mine will probably be the world's first gold producer to make a profit of over £1,000,000 a month; it has reached a monthly profit of £915,000.

A slide in Far Western Rand prices was led by West Driefontein (170s.) while Finance issues fared little better with "Johnnies" dropping to 66s. The last-named thus derived little benefit from its big stake (not to be passed on to "Johnnies" shareholders yet) in the coming Western Areas Gold Mining flotation. Similarly, Anglo Rand (4s. 9d.), Roederand (6s.) and "Freddies" (10s. 9d.) failed to show much response to the fact that their shareholders are being offered a useful participation in the ground-floor terms of the Western Areas issue.

Among the older mines, break-up hopes stimulated Springs (2s. 4½d.) and Brakpan (5s. 6d.) following the decisions to start tax-free capital repayments. Winding-up plans lifted New Modder shares to 1s. 6d.

Diamonds were overshadowed by the fall on Wall Street, De Beers coming back to 171s. 3d. Platinums failed to brighten despite anticipations that a dividend announcement from Rustenburg was imminent.

The base metal sections tended to look rather dreary but price losses and selling were small. The price of copper remained at a useful level for the Rhodesian producers, but buyers of the shares were few and far between. Prices consequently eased back and in view of the higher final dividends that confidently can be expected from the Rhodesians next month, the market seemed to be providing some good buying opportunities for those investors able to take time off from election considerations.

Tin shares were steady for the most part, but here again buying orders were scant. Pengkalen, however, moved up to 15s. at one time on the four-for-one scrip issue proposals, and the East was a buyer of Gopeng (14s. 4½d.).

Otherwise, Lead-zincs moved uncertainly. Consolidated Zinc softened to 63s. 9d., their big U.K. interests causing the share price to be swayed by occasional apprehensions about the outcome of the General Election. Although unaffected by home politics, Broken Hill South (11s. 3d.) failed to improve following their higher dividend and profits.

INDIAN COPPER CORPORATION

ANOTHER SATISFACTORY YEAR

MR. P. E. G. W. PARISH ON PRICE FLUCTUATIONS

The 35th annual general meeting of the Indian Copper Corporation Limited was held on September 23 in Calcutta.

Mr. P. E. G. W. Parish (the Chairman), who presided, in the course of his speech, said:

The price at which your Company's products are sold is, naturally, closely in line with the world price of metal, at which price imports of copper into India have, of course, to be purchased. It is, therefore, necessary to consider the trend of world copper prices during last year.

March, 1956, saw the peak at £436 10s. per ton on the London Metal Exchange, and from then until December, 1957, the price gradually fell to under £180. In 1958 the price during the first six months fluctuated between £161 and £200 and then rose gradually to £252 in October, declining to about £220 at the end of December. Since the beginning of this year prices have again risen to over £250 and during the past month or so have been steady at around £230.

A further reduction in price due to world over-production has only been averted recently by strikes in various producing countries. It seems to me that when these strikes are settled it will be necessary for the big producers to curtail production, as they have done in the past; otherwise over-production will inevitably result in a downward trend in prices to unremunerative levels.

So far as India is concerned of course, we produce only a part of the country's total requirements and therefore there is no question of curtailment of output by us. On the contrary, it is our intention to increase production as much as possible within the limits of our capacity.

You will see from the Directors' report that on average all your Company's products have been sold at prices rather below the previous year and this has naturally affected the Company's results.

Working Review

In 1957 copper production was a record at 7,848 tons. This year although the ore milled rose from 440,671 to 442,088 tons, the amount of copper produced was 7 tons less than last year.

Total sales amounted to 10,966 tons as against 10,301 tons last year.

The demand for our products remains firm though one cannot help expressing some anxiety that, owing to foreign exchange difficulties, import licences for Zinc, which is the complementary metal used for the manufacture of Brass, may not be issued as freely as required.

During the year prospecting was continued throughout our leased area in an endeavour to locate other economic ore bodies to replace those which are rapidly becoming depleted.

It is too early yet to say whether these prospecting operations can be considered successful and more work will have to be done before any final conclusion can be drawn. It is satisfactory, however, that the ore reserves at the end of the year stood at 4,034,174 as against 3,850,757 short tons at the end of 1957.

As regards costs, we are now mining at a deeper level where costs are naturally higher, and it is not possible to foresee any reason to believe that costs in the future can be reduced. On the con-

trary, they are likely to increase.

I am glad to say that during 1958, on the whole, relations with the workers remained fairly good, and as a result production during the year has been comparatively unaffected by labour disputes.

It cannot be said, however, that the situation is entirely satisfactory, as demands by Unions, of varying hues, continue to cause tension, not only to us but to many other industrial concerns on this side of India.

Kyanite

Sales of Kyanite during 1958 amounted to 14,649 tons compared with 18,267 tons in 1957. The price has had to be reduced slightly in order to compete with synthetic materials produced in consuming countries which threaten the future of Kyanite exports.

It is hoped that sales can be maintained at roughly this level again in the present year and every effort is being made to preserve our present markets and to find new outlets.

I have no doubt that some of you have read in the newspapers about the suits in regard to your Company's Kyanite leases, which have recently been decreed in favour of the Bihar Government on appeal in the High Court after the original suits had been decreed in the Company's favour.

The position now is that the Company has applied to the Court for leave to appeal to the Supreme Court. I cannot, therefore, say more about this matter at present, except that it is the opinion of our legal advisers that we have a good case.

Electrolytic Plant

Last year your Chairman told you that the Company had had under consideration for some time, in consultation with their technical consultants, a project to manufacture Electrolytic copper. Negotiations have reached an advanced stage and application has been made to Government for the release of the necessary foreign exchange. As matters now stand we are waiting for the final approval of Government, on receipt of which the whole project will be put in hand.

A considerable sum of money, amounting to approximately £700,000, will be required to finance this scheme, but it is expected that this can be provided within the Company's own resources.

Accounts

The profit for the year, before providing for taxation, depreciation and reserves, amounts to £997,848. Your Directors have decided to place £150,000 to Depreciation and £125,000 to General Reserve. Income Tax and Supertax on profits for the year amount to £439,856.

The Directors recommend that the Dividend of 18% should be maintained involving further taxation on this dividend of £27,426. It is proposed that £71,312 should be carried forward.

I think you will agree that on the whole we have had another satisfactory year and I am sure that I speak for you all in thanking Mr. N. A. B. Hill, the General Manager, and all his staff, for the excellent services they have rendered to the Corporation throughout the year.

The report and accounts were adopted.

KENTAN GOLD AREAS LIMITED

MR. C. J. HOLLAND-MARTIN'S REVIEW

The Annual General Meeting of Kentan Gold Areas Limited was held on September 16, 1959, at The Chartered Insurance Institute, E.C.2. **Mr. C. J. Holland-Martin, M.P.** (Chairman) presided.

In his printed review, the Chairman recalled the reduction in capital sanctioned in November, 1958, followed by the amalgamation of the company with The Zambesia Exploring Company Limited as a result of the acceptance by more than 90% of the stockholders of the latter company of an offer to acquire their holdings by exchange of shares. He pointed out that in these days the very great risks inherent in developing Central African mining enterprises could not be justified unless means could be found of setting off the losses of the less profitable against the profits of the more successful, and for these reasons the Boards of the two companies had decided that the time had come for a merger of their interests.

The consolidated accounts for the nine months ended March 31, 1959, which included the results of the Zambesia company for the year to that date, showed a profit of £145,793. After bringing forward the previous year's balance, making various adjustments and transferring to Capital Reserve the pre-acquisition profits amounting to £28,097, a balance of £175,930 remained available for distribution. An interim dividend of 1s. 6d. per share (7½%) had been paid on June 19, 1959, and it was proposed to recommend a final dividend of 2s. 0d. per share (10%), making a total dividend of 3s. 6d. per share (17½%) for the period. For the years ended March 31, 1957, and March 31, 1958, The Zambesia Exploring Company Limited had paid dividends of 20% per annum out of consolidated profits before taxation of £243,595 and £264,305 respectively. The decrease was due to the reduced dividend from Tanganyika Concessions Limited, which had been forecast last year, and to the fact that the Board had, in the market conditions prevailing, been reluctant to realize profits on sales of investments.

The Chairman emphasized that the company's main interest was now its stake in Tanganyika Concessions Limited, and gave details of this and the other principal holdings, including the subsidiary, Geita Gold Mining Company Limited, and Tanganyika Holdings Limited, in which a 50% participation was held.

The Report and Accounts were adopted, and Special Resolutions providing for amendment of the Company's Articles of Association as regards the Directors' Borrowing Powers and the remuneration of directors were passed.

DAVIES INVESTMENTS LTD., Bankers, still offer 7½ per cent on sums £20 to £500 (withdrawal on demand) with extra ¼ per cent on each £500 unit. Details from Investment Dept. M.N. Davies Investments Ltd., Danes Inn House, 265 Strand, London, W.C.2.

Publications Received

Hot Dip Galvanizing, published by the Zinc Development Association, 34 Berkeley Square, London, W.1. Pp. 355. Price £3 3s. per copy, post free. These are the Edited Proceedings of the Fifth International Conference on Hot Dip Galvanizing are now available in a single volume.

The Conference, held in Holland and Belgium in June, 1958, was organized by the Zinc Development Association on behalf of the European General Galvanizers' Association. Three hundred and fifty delegates from 20 countries attended, a fourfold increase in numbers since the first conference of 1950 which demonstrates the lively and growing interest in hot dip galvanizing. Australia, Canada, South Africa, U.S.A. and U.S.S.R. were represented in addition to most European countries.

Twenty papers by 19 authors from eight countries were presented. They have been printed as ten chapters in the Conference Proceedings and each chapter concludes with an edited account of the discussion which followed. In several cases important written contributions received since the conference have been included to bring the book completely up to date. Brief notes on each of the chapters are attached.

Many aspects of galvanizing practice of interest to both specialist and general galvanizers are described, and users of galvanized products will find the chapters on painting and thickness testing of considerable interest.

The book is profusely illustrated with charts, diagrams, line drawings and photographs, and a comprehensive table of contents makes for easy reference.

A Summary of the Geology of Tanganyika, Part I, Introduction and Stratigraphy, has been issued by the Government of Tanganyika as Memoir No. 1. The authors are A. M. Quennell, A. C. M. McKinlay, and W. G. Aitken. This record was prepared in draft in 1956 and used as the authority for the preparation of *Lexique Stratigraphique International*, Volume IV. "Afrique", Fascule 8c, "Tanganyika", which appeared in 1957.

A valuable contribution to the geological knowledge of this territory is Bulletin No. 29 of the Geological Survey of Tanganyika, *The Geology of the Nyanzwa Area*, by J. K. Whittingham. The geology portrayed on the Nyanzwa sheet is of more than local interest. The author has gone a long way towards elucidating the problem of the relationship of the three established geological divisions in the Nyanzwa area. As the director of the Geological Survey, Dr. A. M. Quennell, points out in a foreword, work such as this provides the geological setting or framework within which the search for minerals can most profitably be pursued.

Memoir No. 299 of the Geological Survey of Canada is concerned with the *Whitesail Lake Map Area—British Columbia*, the author being S. Duffell. This area came into prominence on account of the various projects resulting from the power developments of Alcan. New exploration was done on the

known mineral deposits and active prospecting led to the discovery of others. The mapping clearly shows that the Coast Mountains, though considered by many to be composed mainly of granitic rocks which are rarely good hosts for mineral deposits, are actually underlain by extensive areas of non-granitic rocks known to contain important orebodies. The Coast Mountains, therefore, contain areas well worth prospecting.

Other recent publications by the Department of Mines and Technical Surveys, Canada, include Geological Survey of Canada Memoirs No. 304 (*Silurian and Lower Devonian Formations in the Eastern Part of Gaspé Peninsula, Quebec*, by L. M. Cumming); and No. 296 (*Vernon Map-Area British Columbia*, by A. G. Jones).

Diamond Drill Exploration for Chromite at Byrapur, Mysore State, India, is the subject of a paper by B. P. Radhakrishna, published as Bulletin of the Mysore Geologists' Association No. 16. Lenses of high grade chromite ore analysing over 48 per cent Cr_2O_3 are known to occur at Byrapur, in Hassan District, Mysore State. Roughly 100,000 tons of ore have already been mined from this property.

The investigation described was directed to locate fresh orebodies and ascertain the extension at depth of those already known. In all, eight holes totalling a depth of 2,472 ft. were drilled. Although no new lenses were located, drilling proved the continuation of the main ore lens in "A" pit to a depth of 650 ft. The proved reserves are now estimated at 700,000 tons of ore of over 46 per cent grade.

Bulletin 1, of the Geological Survey Department, Suva, Fiji (price 10s.) is entitled *Geology of North Tailevu, Viti Levu*. The author is R. E. Houtz, whose report covers an area of about 150 sq. miles in Tailevu. Emphasis is on the structure and geologic setting of the metamorphics and intrusives, especially their relations to mineralization.

Interest has been shown in the possible economic potential of the Wainivesi area for over 20 years. Some exploratory work and drilling was undertaken, but available records are few and are concerned mostly with the possibilities of gold. More recently interest has been directed to base metals. This is an important area which deserved priority in regional mapping in order that a better understanding of the rock formations and structural controls determining mineralization could be obtained. There was also the strong possibility of locating new mineralized zones. The work has now been completed on a scale of 1/35,000 and in its first bulletin the Geological Survey records the important observations on all these points. It is anticipated that, as a result of this report, interest by mining companies will increase.

The Maranboy Tinfield is situated 40 miles south-east of the township of Katherine, in the Northern Territory of Australia. The ore mineral is cassiterite. An assessment of this field has been

published by the Commonwealth of Australia, Department of National Development, Bureau of Mineral Resources, Geology and Geophysics, as Bulletin No. 37, *The Maranboy Tinfield, Northern Territory*, by B. P. Walpole.

A detailed study has shown that of the numerous cassiterite-bearing lodes only three can be considered as likely to yield large tonnages of ore in the future. The data obtained from detailed mapping, sampling and production records show that they may contain an aggregate of 2,767 tons of ore, assaying 1.23 per cent Sn., per ft. of depth. Selective mining by small operators would, as it has in the past, raise the grade with a concomitant reduction in the aggregate of tons of ore per ft. of depth.

The continued life of the field is seen as dependent upon testing the probable continuance or repetition of ore shoots at depth, the institution of more efficient mining methods, and the provision of adequate and efficient milling facilities.

The drainage basin of the Cuyuni River has made an important contribution to the gold production of British Guiana. In Geological Survey of British Guiana, Bulletin 27, entitled *The Gold Deposits of the Cuyuni River*, R. T. Cannon recounts the history, type of deposit, method of working and future possibilities of the various tributaries and mines. An account is also given of the Banka drilling by the Geological Survey, which, so far, has been confined to the Cuyuni River. Several mining companies have mined and prospected in this area and the pertinent conclusions of their reports are summarized, where available. Though the likelihood of any further development of the gold deposits in this area does not appear promising, it is considered that some deposits could be worked economically on a small scale if the gold workings were integrated with diamond recovery.

The Karroo System and Coal Resources of the Gwembe District, North-East Section, are surveyed by M. S. Gair in Bulletin No. 1 of the Department of Geological Survey, Northern Rhodesia. The Bulletin contains the results of the first part of a survey of the whole of the Zambesi Valley, and it is considered that, in view of the detail with which this was carried out, nothing of material significance is likely to be added to it for many years. All the known occurrences of coal have been investigated and a number of new ones discovered. On the basis of these results, it is improbable that any coal in the area described will be worked in the foreseeable future.

Entitled *The Seven*, a Chamber of Commerce booklet has been prepared (Chamber of Commerce Publications, 68 Queen St., E.C.4, 2s. 6d. post free) as a simple guide to the plan for a Free Trade Association among the "Seven". Copies are obtainable through any Chamber of Commerce affiliated to the Association of British Chambers of Commerce.

A review of the *Regional Geology and Mineral Resources of the Olary Province*, by B. Campana and D. King, has been issued by the Geological Survey of Southern Australia, as Bulletin No. 34. The survey is in two parts, the first of which deals with regional geology and the second with mineral resources.

Coming Events

The programme of the Institution of Mechanical Engineers for the Session 1959-60 includes a Symposium on Recent Mechanical Engineering Developments in Automatic Control, to be held on January 5, 6 and 7, 1960. The Thomas Lowe Gray Lecture will be given on Wednesday, January 27, by Dr. J. J. McMullen, whose subject will be "Technical and Economic Aspects Covering the Ocean Transportation of Liquid Methane".

Courses announced by the Sir John Cass College, Jewry Street, Aldgate, London, E.C.3, for the first term, Session 1959-60, include Absorption Spectroscopy, Spectrochemical Analysis, Electronic Computing Systems Part I, Relaxation Methods, Radioactive Isotopes in Metallurgy and Ceramics, The Modern Kinetic Theory of Liquids, Radiochemistry and Radioactivity, and Statistical Methods in Scientific and Industrial Research.

The ore and coal mining industries are

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to be the focal point of this year's International Metz Fair, to be held in the eastern French city in the first half of October. Mining machinery and equipment from various countries in Europe will be one of the exhibition's main features. Further details on the Metz Fair are obtainable from Direction, 1 avenue de l'Ampithéâtre, Metz.

A joint meeting of The Iron and Steel Institute and the Corrosion Group of The Society of Chemical Industry is being held at 14 Belgrave Square, London, S.W.1, on the afternoon of Thursday, October 15, 1959, at 2 p.m. The meeting has been arranged in order to discuss the Sixth Report of the Corrosion Committee, published recently as No. 66 in the Special Report Series of The Iron and Steel Institute. The meeting will consist of three sessions, under the joint chairmanship of Dr. U. R. Evans, F.R.S., and Mr. L. Kenworthy; the sessions will be devoted to Sections 2, 3, and 4 of the Report, dealing with atmospheric corrosion, protective coat-

ings, and marine corrosion respectively. In view of the limited accommodation at 14 Belgrave Square, admission to the meeting will be by ticket only.

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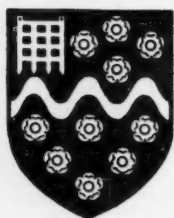
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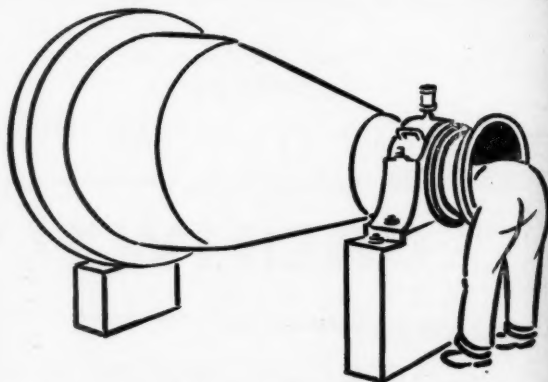
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